

GEO TIMES

Professional News Magazine



March 1958

Volume II, No. 9
Published Monthly by the
American Geological Institute



SATISFIES THE MOST EXACTING REQUIREMENTS

RESEARCH POLARIZING MICROSCOPE

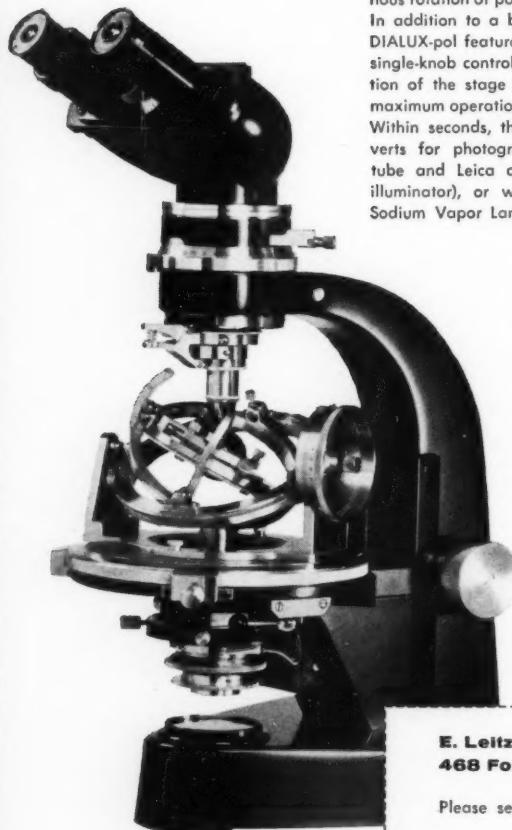
DIALUX-POL

The new LEITZ DIALUX-pol is the most advanced, universal polarizing research microscope ever manufactured. It was designed for the geologist, mineralogist, petrographer, paleontologist, and the industrial research microscopist.

The DIALUX-pol maintains the principle of interchangeability, famous with all LEITZ precision instruments, so that it is readily used for transmitted light as well as for reflected-polarized light. With the simple addition of a connecting bar, it provides synchronous rotation of polarizer and analyzer.

In addition to a built-in light source and condenser system, the DIALUX-pol features many other operational advantages: unique single-knob control of both coarse and fine adjustment by alteration of the stage height (and not the tube), thus focusing with maximum operational ease.

Within seconds, the DIALUX-pol, through LEITZ accessories, converts for photography (through combined monocular-binocular tube and Leica camera), for ore microscopy (through vertical illuminator), or will accommodate the LEITZ Universal Stage, Sodium Vapor Lamp, and other facilities.



- monocular or binocular vision
- combination tube FS for photography
- synchronous polarizer-analyzer rotation upon request
- dual coarse and fine focusing
- built-in light source; 6-volt, 2.5-amp, variable intensity
- vertical illumination for ore microscopy
- polarizing filters or calcite prisms
- adaptable to all universal stage methods

Send for the DIALUX-pol information bulletin—then see and examine this fine instrument for yourself.

**E. Leitz, Inc., Department GT-3
468 Fourth Ave., New York 16, N.Y.**

Please send me the LEITZ DIALUX-pol brochure.

Name _____

Street _____

City _____ Zone _____ State _____

E. LEITZ, INC., 468 FOURTH AVENUE, NEW YORK 16, N.Y.
Distributors of the world-famous products of
Ernst Leitz G.m.b.H., Wetzlar, Germany—Ernst Leitz Canada Ltd.
LEICA CAMERAS • LENSES • MICROSCOPES • BINOCULARS

25158

Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.

- Mar. 7-8, 1958—AAPG: Pacific Section Ann. Mtg., Ambassador Hotel, Los Angeles, Calif.
- Mar. 10-13, 1958—AAPG-SEPM ANNUAL MEETING, Biltmore Hotel, Los Angeles, Calif.
- Mar. 20-21, 1958—AIME: MID-CONTINENT LOCAL SEC; Petroleum Production & Reservoir Engineering Conf., Mayo Hotel, Tulsa, Okla.
- March 23-29, 1958—ACSM-ASP: Consecutive Meetings and Co-Exhibit, Shoreham Hotel, Washington, D. C.
- Mar. 29-30, 1958—MEXICAN ASSOC. OF PETR. GEOLOGISTS, 2nd Conv. Write: Asociación Mexicana de Geólogos Petroleros, P.O. Box 1884, Mexico 1 DF Mexico
- March 27-29, 1958—OPTICAL SOCIETY OF AMERICA, Spring meeting, Sheraton-Park Hotel, Washington, D. C.
- Mar. 27-28, 1958—SEPM, (PERMIAN BASIN SECT.) Ann. Tech. Mtg. Registration and sessions at Hotel Scharbauer, Midland, Tex. J. P. D. Hull, Jr., Chmn. Loc. Comm.
- Mar. 27-29, 1958—AIME: PACIFIC SOUTHWEST CONF.; St. Francis Hotel, San Francisco
- Mar. 28-29, 1958—GSA, CORDILLERAN SECT., Annual Meeting, Eugene, Ore. Field trip on March 27.
- April 3-5, 1958—PENNSY. ACAD. OF SCIENCE, Lafayette Coll., Easton, Pa. Joint session April 4 with eastern Sect. of AGT.
- April 10-12, 1958—SEPM, SPRING FIELD TRIP of the Permian Basin Sect., to localities in Apache Wylie, Van Horn & Indio, etc., Trans-Pecos Texas. Registration at Van Horn April 10. Write: Wayne Roye, Box 682, Midland, Texas.
- April 17-18, 1958—SEGP, 11th Annual Midwestern Meeting sponsored by Geophys. Soc. of Tulsa & the Tulsa Geol. Soc., Mayo Hotel, Tulsa, Okla.
- April 17-18, 1958—AIME, SOC. PETROLEUM ENGINEERS, Gas Technology Symposium, Lou.-Ark., Miss. & East Texas Sections, Shreveport, La.
- April 17-19, 1958—SIGMA GAMMA EPSILON, 19th Biennial Convention, Pittsburgh, Pa.
- April 17-19, 1958—AIME: PACIFIC NORTHWEST REGIONAL CONF., Spokane, Wash.
- April 21-22, 1958—FOURTH INSTITUTE ON LAKE SUPERIOR GEOLOGY, sponsored by Superior Geology Club & Univ. of Minnesota, at Duluth Branch of the University, Duluth 11, Minn. Field trip on April 20.
- April 23-25, 1958—SECOND INTERNATIONAL WILLISTON BASIN SYMPOSIUM, sponsored by Sask. Geol. Soc. & N. D. Geol. Soc., Provincial Museum Bldg., Conv. Hdqtrs. Hotel Saskatchewan, Regina, Sask. Write: Hous. Comm., P.O. Box 234, Regina, Sask.
- Apr. 27-30, 1958—AAPG, ROCKY MTN. SECTION, 8th Ann. Conv., Industrial Bldg., Natrona County Fairgrounds, Casper, Wyoming.
- May 1-3, 1958—GSA, SOUTHEASTERN SECTION, Co-sponsors are Ala. Geol. Surv. and Dept. of Geol. Univ. of Ala.; Theme: Economic Geology of the Southeastern U. S. in relation to future world events. Tuscaloosa, Ala.
- May 5-6, 1958—AIME, SOC. PETROLEUM ENGINEERS, Third Biennial Secondary Recovery Symposium, Wichita Falls, Texas.
- May 5-7, 1958—AGU, Thirty-Ninth Ann. Mtg., Nat. Acad. Sci., Washington, D. C.
- May 8-10, 1958—GSA ROCKY MOUNTAIN SECTION, annual meeting, Golden, Colo. Field trips May 10.
- May 9-11, 1958—AIME: URANIUM SECT., 3rd Annual Uranium Symposium, Moab, Utah.
- May 17-18, 1958—FRIENDS OF THE PLEISTOCENE, For information write: Wilson M. Laird, Univ. of North Dakota, Grand Forks, N. D.
- July 4-7, 1958—SWEDISH GEOLOGICAL SURVEY, 100th Jubilee Meetings, Stockholm, Sweden. Excursions before and after meetings.
- Aug. 24-30, 1958—INTNTL. CONGRESS OF PREHISTORY & EARLY HISTORY, Hamburg, Germany. For information write: Professor Gerhard Bersu, Frankfurt-am-Main, Palmengartenstrasse 10-12.
- Aug. 26-28, 1958—SYMPOSIUM ON PROBLEMS OF THE LAHONTAN BASIN, spons. by Sigma Xi Club of Univ. of Nevada, on campus, Reno, Nevada.
- Sept. 2-4, 1958—SVP: Annual Meeting with SSE, University of Michigan, Ann Arbor, Mich.
- Sept. 2-5, 1958—NINTH ALASKAN SCIENCE CONF., Univ. of Alaska, College, Alaska
- Sept. 10-12, 1958—AIME: SOC. OF MINING ENGRS., Rocky Mountain Mins. Conf., Salt Lake City.
- Sept. 18-20, 1958—ROCKY MT. ASSOC. OF GEOLOGISTS Field Trip, Maroon Basin of W. N. Colo., to be held in conjunction with Colo. Pennsylvanian Symposium guidebook presentation. Date is tentative.
- Oct. 5-8, 1958—AIME: SOC. PETR. ENG., Fall Meeting, Houston, Texas.
- Oct. 9-11, 1958—OPTICAL SOC. OF AMER., Ann. Mtg., Statler Hotel, Detroit, Michigan.
- Oct. 13-16, 1958—SEGP: 28th Ann. Meeting, Gunter Hotel & Municipal Auditorium, San Antonio, Texas.
- Oct. 16-17, 1958—AIME: Southern California Petroleum Sect. Fall Meeting, Biltmore Hotel, Los Angeles.
- Oct. 22-24, 1958—AAPG, Southwest Regional Meeting, sponsored by SW Fed. of Geol. Soc., City Auditorium, Mineral Wells, Texas.
- Oct. 23-25, 1958—AIME: Mid-America Minerals Conference, St. Louis.
- Oct. 27-29, 1958—GULF COAST ASSOC. OF GEOLOGICAL SOC'S., Ann. Mtg., Corpus Christi, Texas
- Nov. 6-7, 1958—AAPG: PACIFIC SECT. Ann. Mtg., Ambassador Hotel, Los Angeles, Calif.
- Nov. 6-8, 1958—GSA: ANNUAL MEETING, St. Louis, Mo. Also SEGeG, SVP, PS & AGT.

PACIFIC MARINE STATION

Pacific Marine Station, a branch of the College of the Pacific, will offer a course in marine paleontology in addition to its usual course in marine invertebrate zoology during the summer session, from June 23 to August 6, 1958. The course will stress problems of marine paleoecology and evolution with special reference to local living and fossil assemblages, and will be given by Ralph G. Johnson of the University of Chicago. Pacific Marine Station also announces a pre-doctoral fellowship in marine biology for a student who can conduct his doctoral research in the rich and varied marine and estuarine environments in the neighborhood of the station. The fellowship, which will pay \$1800 per year, also includes living facilities. For further information address Joel W. Hedgpeth, Director, Pacific Marine Station, Dillon Beach, California.



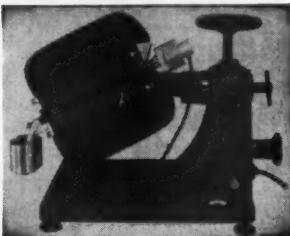
The variety of separations made possible by the ISODYNAMIC Magnetic Separator is practically infinite. Its use is limited only by the great number of magnetic minerals in nature—even many not usually thought of as magnetic—and their range of susceptibilities.

Peculiar to the ISODYNAMIC Separator is the special configuration of the pole pieces which accounts for its exceptional selectivity. This results in a constant force on a particle of given susceptibility, regardless of its position in the operating space.

S. G. FRANTZ CO., INC.—ENGINEERS

P.O. Box 1138
Trenton 6, New Jersey,
U.S.A.

Cable Address:
MAGSEP
Trentonnewjersey



INCLINED FEED
Vertical Feed Attachments
also available

Write for
BULLETIN 137-I

HUBCO means * SAFE CONDUCT for Samples from Rig to Lab . . .



NEW Handy Pack at oil field supply jobbers and dealers. Or mail the coupon for free sample, price list and dealer's name.



Herbie Hubco
says INSIST ON

HUBCO
PROTEXO
BAG

Hutchinson Bag Corp.
Hutchinson, Kansas
Send sample and information to:

NAME _____

ADDRESS _____



"WEBSTER
"SAFE CONDUCT"—
that which assures
a safe passage" . . .

This Month in GEOTIMES



Professional News Magazine

Published by THE AMERICAN GEOLOGICAL INSTITUTE

Robert C. Stephenson,
EDITOR

Kathryn Lohman
CIRCULATION MANAGER

Vol. II, No. 9

March, 1958

	Page
Waterwitching in the United States By Ray Hyman and Evon Z. Vogt	6
Geologists in the News	7
Pacific Science Meeting By Rhodes Fairbridge	8
AGI Undertakes International Abstracts Survey	9
USGS Problems	11
Geologic Column and Scale of Time—AGI data sheet No. 5	13

AMERICAN GEOLOGICAL INSTITUTE

Officers

PRESIDENT
J. V. Howell
VICE PRESIDENT
Paul L. Lyons
PAST PRESIDENT
J. L. Gillson
SECRETARY-TREASURER
Donald H. Dow
EXECUTIVE DIRECTOR
Robert C. Stephenson

The American Geological Institute operates as a separate entity under the National Academy of Sciences - National Research Council.

Member Societies

American Association of Petroleum Geologists
American Geophysical Union
American Institute of Mining Metallurgical and Petroleum Engineers
Association of American State Geologists
Association of Geology Teachers
Geochemical Society
Geological Society of America
Mineralogical Society of America
Paleontological Society
Seismological Society of America
Society of Economic Geologists
Society of Economic Paleontologists and Mineralogists
Society of Exploration Geophysicists
Society of Vertebrate Paleontology

GEOTIMES is published monthly by the American Geological Institute at Williams & Heintz Lithograph Corporation, Washington, D. C. Editorial, Circulation and Advertising Offices are at 1515 Massachusetts Ave., N.W. Address all correspondence to 2101 Constitution Ave., N.W., Washington 25, D.C.

Subscriptions: Distributed to members of member societies as a part of their societies' membership. Non-member, U.S.A. and Possessions, Canada and Mexico, \$2.00 per year; elsewhere, \$2.50 per year.

The American Geological Institute and its member societies assume no responsibility for the statements and opinions advanced by contributors to GEOTIMES.



the beginning of a **million dollar** detective story

Men, vehicles and instruments bound for the middle east

The cast of this story may include a part for you. GSI is a leader in the worldwide search for new petroleum reserves. Emphasis is shifting to foreign areas and there is a world of opportunity awaiting those who can qualify for a career in geophysical exploration.

GSI has openings for college graduates trained in geophysics, physics, engineering, math and geology.

For a rewarding career, which may take you from California to Calcutta, join the cast . . . join GSI.

Write for our booklet, "With GSI The World Is Your Office."

XGSI... continuing leadership through research and growth



GEOPHYSICAL SERVICE INC.

Department K Box 35084
Airlawn Station, Dallas 35, Texas

Vulnerable

Geology and geophysics are essential to exploration. Intensive and increasingly efficient exploration is essential in maintaining adequate reserves of petroleum and mineral resources. Exploration activities fluctuate with the climate of business and with many intermeshed, complex factors of mineral economics.

When business is booming along, venture capital is available and exploration is at a high level—at such times geologists and geophysicists are much in demand. When metal prices fall and crude oil prices sag, exploration money begins to dry up and the demand for geologists and exploration geophysicists softens.

Between the end of World War II and 1957 there was a steady growth in the demand for geoscientists to meet the exploration requirements of industry. Within the past year the demand has slackened greatly and today there is certainly no manpower shortage in the profession. The current softness in exploration employment is due in part to the generally cautious attitude of business and to the shift of industry to lower cost, foreign sources of supply.

The geologists and geophysicists who are employed by industry in exploration are *vulnerable*. A substantial force of geoscientists has been developed to meet the unprecedented exploration demand in the past decade. This force cannot expand and contract to match the gyrations of markets and business conditions.

It is a matter of concern to the profession as a whole that exploration be sufficiently stabilized so that employment of geologists and geophysicists will also have a healthy stability. If the demand for geoscientists fluctuates widely, the effect can well be disastrous on the recruitment of the youthful talent needed to carry the banner of the profession in years to come. Under these circumstances it is conceivable that the profession will continue to attract "warm bodies" but lose out on talent and quality. Youngsters with bright scientific potentialities are not likely to be attracted to a profession with unstable employment prospects.



OUR COVER

Geologist examines well cuttings from wildcat well in Rocky Mountain area. Photo by courtesy of Carter Oil Co.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

Some facts and theories on

Waterwitching in the United States

by

RAY HYMAN and EVON Z. VOGT¹

The historical record on dowsing began in 1556 when Georgius Agricola published his account on the divining activities of the German miners. In becoming Americanized, divining has changed very little. It is now most commonly referred to as "water witching" and it is most frequently employed to locate underground water rather than metallic veins. But even though he is separated from Agricola's diviner by 400 years and the Atlantic Ocean, the American dowser today still employs the forked twig in exactly the same manner as described by the famous 18th century camp physician.

Even in Agricola's time the divining rod was the subject of lively controversy. Agricola himself questioned its efficacy. In spite of vehement opposition, the use of the rod spread throughout Europe and was introduced to this country in the 17th and 18th centuries. Here again in the face of almost unanimous opposition by geologists, waterworks engineers, and government officials, waterwitching diffused rapidly throughout rural America. In a recent survey we discovered that approximately 25,000 diviners are currently plying their trade in the U.S.A.

Such tenacity in the face of overwhelming opposition naturally arouses the curiosity of the social scientist. Why does this unorthodox persist in a culture that otherwise prides itself on its scientific and technological advancements?

It was this question that motivated our study of waterwitching in the U.S.A. Supported by grants from the Hodgson Fund and the Laboratory of Social Relations of Harvard University, we surveyed a sample of 500 county agricultural extension agents for relevant information.

First, we had to come to grips with the question of waterwitching's validity. Perhaps witching survives because there's something to it. Such is the argument of many champions of divining. Indeed, some even go so far as to contend that the very fact that witching has survived for centuries is proof of its efficacy.

This "test-of-time" argument is, of course, not taken too seriously by scientists. Such soothsaying arts as astrology and palmistry have a longer history than witching, but these types of fortune telling find far fewer champions. The more sophisticated defenders, consequently, prefer to base their arguments on a more substantial

foundation. They point to the "evidence."

The evidence concerning witching's validity comes from various sources and varies in quality. From the scientist's viewpoint, however, we can lump all the evidence into two categories.

The first category consists of evidence that comes from case histories of actual witching performances—personal accounts, second-hand stories, anecdotes, government records—and from field tests in which a group of observers come together to "test" the prowess of a diviner as he attempts to locate a well site. Evidence of this type is characterized by the fact that no standards are supplied against which to assess the diviner's performance.

What does it mean, for example, if a diviner is "successful" in 8 out of 10 selections? Even if we ignore the difficult problem of defining a "success," such evidence is meaningless without a control baseline. If, under identical conditions, an alternative method of selecting well sites is successful only once in 10 tries, we might take a second look at the diviner's performance. But if the alternative method is also successful in 8 out of 10 tries, we would attach a different interpretation to the diviner's performance. Without such a comparison, the evidence must always be ambiguous.

The second category consists of field

¹ Ray Hyman and Evon Z. Vogt are associated with the Department of Psychology, Harvard University. This article is based on the findings of a nation-wide survey.

experiments and laboratory experiments in which a controlled comparison is provided against which to evaluate the diviner's performance. An example of such an experiment is the one recently performed by the American Society for Psychical Research. Twenty-seven diviners each independently traversed the same plot of land and witched a well site at which they estimated the depth and rate-of-flow of the water. These estimates, when compared against actual values obtained from subsequent sinking of test wells, were no better than would be expected by chance. Further, the estimates of depth made by two experts—a geologist and a water-works engineer—under the same conditions were superior to witched estimates as well as the chance baseline.

Surprisingly enough, both believer and sceptic agree upon the story to be derived from these two categories of evidence. The strongest support for the validity of waterwitching comes from the case histories and the field tests. But as we move from the uncontrolled case history to the field and laboratory experiment the case for witching becomes weaker and weaker. The diviner whose reputation is based upon glowing accounts and fervent testimonials suddenly loses his ability when exposed to the cold stare of scientific observation.

It is when we come to the moral of the story that believer and sceptic part company. The believer perceives the situation as follows: The diviner performs badly under scientific scrutiny because his delicate powers are adversely affected by the artificiality of the experimental conditions, the hostility of the sceptical atmosphere, and the stress of being "on the spot." Further, the claim is often made—only after negative results—that the scientist tested an inferior diviner; he would have obtained positive results if he had tested a "good" diviner.

The sceptic draws a simpler moral. The much-vaunted powers of the waterwitch cannot withstand scientific scrutiny because they never existed in the first place.

At the moment, then, there is no evidence meeting scientific standards that would convince us that waterwitching works.

Independent of the validity of waterwitching, we were able to formulate four theories as to why the practice persists in this country. And for each theory, we were able to make an empirical prediction concerning the proportion of wells that are witched under certain conditions.

The survival theory. This theory states
(Continued on page 18)

GEOLOGISTS in the NEWS

Geologist-executives have figured prominently in petroleum news of recent weeks. NORMAN HARDY was recently elected president of the Arabian American Oil Company to succeed R. L. Keyes. Hardy began his career as a geologist with the Standard Oil Company of California in 1926. Another geologist, A. J. GALLOWAY, who joined the Shell Oil Company in 1928, was recently named executive vice president of that company. He has been a member of the Shell board since 1953 and has been in charge of exploration and production.

C. F. DOHM was recently elected president and director of Pan American International Oil Company, a newly formed subsidiary of Pan American Petroleum Corp. with principal offices in New York. A geologist with wide exploration and production experience abroad, Dohm is a well-known petroleum executive.

The Socony Mobil Oil Company, Inc., recently elected geologist FRED H. WILCOX to its board of directors. Wilcox is manager of the production department. Also in Socony, FRED W. BARTLETT was made chairman of the board. These men are but a few of the many geologists who have risen to high executive posts in petroleum companies. There are also numerous geologist-executives in mining — men like FRED SEARLS, Jr., and DONALD H. McLAUGHLIN (*GEO TIMES*, February 1958). It is indeed unfortunate that the professional background of such geologist-executives is rarely brought to the attention of the public.

We can point to our profession with pride for many members have achieved positions of great responsibility and have contributed significantly to the advancement of science and technology. If our profession expects to receive a favorable press, we must have an aggressive public relations program. It is next to impossible to fight unfavorable publicity through defensive tactics. If we think that we do not need favorable publicity for geology and geologists, maybe we ought to sharpen our thinking.

PACIFIC SCIENCE MEETING

reported by
RHODES FAIRBRIDGE

In the June issue of *GeoTimes* we reported the forthcoming meeting of the Pacific Science Association to be held in Bangkok, Thailand, in November. Former meetings of that body have occurred (since the early twenties) almost every four years—in the various countries bordering the Pacific: Canada and the United States, Australia, New Zealand, the East Indies, Philippines and Japan.

This time it was Thailand, and the Siamese people, following the example of their gracious young King and Queen, decided to make the occasion a demonstration of what a small but free country can do in the way of fostering science in an atmosphere of warm-hearted friendship and good will. The visitors from overseas were greatly impressed. The conference ran according to plan; meetings began as scheduled; field trips were well organized and enjoyed by all.

Thailand is weak in scientifically trained people. The Chulalongkorn University has departments of Chemistry and Physics, and of Agriculture, but none of Geology, Geophysics or Geography. A resolution from our section noted and regretted this lack. It is thus obvious that Thailand has much to benefit from Western cooperation, from help through the Colombo Plan and the various U.N. instrumentalities. Signs of United States aid are everywhere; it seems to be well used—new buildings, new highways, dams, canals and so on. The Thai people are happy and well fed, as indeed they should be, in one of the richest rice bowls of the world, but the country is undeveloped industrially and particularly weak in mineral production.

The country now has a fine Department of Mines. A geological report and map has been issued with the cooperation of the U.S.G.S. (through the State Department), and the first geophysical (gravity) survey of the delta region has been completed, with the result that a first wildcat is being drilled on a gravity high, 25 miles north of Bangkok. Some small oil shows and drilling in the western and northern interior do not seem to have great significance, since they are in tiny Tertiary fresh-water basins.

All these things were seen by our congress members, in addition to the actual scientific meetings themselves. It is true that one may generally read the papers just as well when they are printed *after* the meeting, but the discussions between the

papers and over a bowl of curry and rice at the lunch break were invaluable; for it was here that new ideas sparked from the anvil of argument.

The earth science meetings were arranged in Symposia: the nature of the Pacific continental margin (*under Roger Revelle*), Mesozoic orogeny in the Pacific area (*under G. W. Grindley*), relationship of volcanoes to geological structure (*under T. H. F. Klompe*), stratigraphic correlation around the Pacific (*under T. Kobayashi*); and then there were various economic and special sessions, partly in cooperation with other sections: modern advances in geo-physical prospecting, the disposal of radioactive wastes, the progress of I.G.Y., the geology of tin and tungsten . . .

Perhaps the most remarkable new discovery announced was the finding of Ordovician fossils in a thick sedimentary sequence in northwestern Malaya, the first older Paleozoic rocks identified from a very large region.

The Congress was glad to welcome its newest and youngest member, the new country of Malaya, which has now earned independent dominion status and had sent two geologists to the meeting. It was interesting also to see that the U.S.S.R. has now—for the first time—recognized the association by sending representatives including our old friend Academician Scherbakov, and the geophysicist Karus to the meeting. Karus, speaking in good English, presented the results of new seismic refraction surveys at sea between Siberia and the Kuriles. The Russians are just beginning this sort of work, but are freely passing on their results; the picture is rather the same as in the South West Pacific.

We welcomed also the action of the Congress in setting up a committee on Geography, hitherto unrepresented except rather one-sidedly (through Anthropology, etc.). Professor Albert Kolb of Hamburg becomes its chairman.

The next meeting of the Association is to be at Honolulu, Hawaii, in 1961; though the exact date is as yet unannounced. The geology chairman will be Gordon MacDonald, and he will have charge of setting up subcommittees, symposia and all that; interested persons should get into touch with him. The Bernice Bishop Museum at Honolulu is the permanent headquarters of the Pacific Science Association, but this will be the first meeting for forty years in this truly mid-Pacific setting . . . geologists will look forward to it.

AGI Undertakes International Abstracts Survey

The American Geological Institute is undertaking a survey of interest in and probable support of an *International Journal of Geological Abstracts*. The survey, to be conducted with support of a grant from the National Science Foundation, will poll geologists of all countries except those of the Soviet bloc.

A Commission was established in 1956 by the XXth International Geological Congress to consider the establishment of an international abstract service. The membership of the Commission is:

H. M. E. SCHURMANN, The Hague, President
S. VAN DER HEIDE, Haarlem, Secretary
J. D. AFANASJEV, U.S.S.R.
A. BENTZ, Germany
A. J. BUTLER, United Kingdom
P. F. S. FOURMARIER, Belgium
S. H. HAUGHTON, South Africa
E. INGERSON, U. S. A.
J. ROGER, France
J. M. SELLIER DE CIVRIEUX, Venezuela
A. A. THIADENS, Netherlands
E. WEGMANN, Switzerland
E. E. ZAKHAROV, U.S.S.R.

The Commission was organized early in 1957 and the AGI was asked to name a member to represent the United States. Dr. Earl Ingerson was appointed by the AGI and attended the first meeting of the Commission in Holland in June 1957. Tentative plans for the abstracts journal were developed and the Institute was requested by the Commission to undertake a survey of the interest in and probable support of such a journal. The International Journal of Geological Abstracts would be a cooperative project of the geologists of the countries adhering to the International Geological Congress. The geological literature of the world would be covered under approximately seven broad subject sections and the abstracts would appear in English only. The Journal would have an editor-in-chief and editors for each subject section. Abstracting would be done by volunteers. Holland has been proposed as headquarters for the abstract journal since printing costs are much lower there than in the U.S. or Great Britain.

If the survey shows that the abstract journal will be adequately supported, the service will start with about 70 per cent coverage and will build up to essentially complete coverage of all significant world literature. The Commission has reached a tentative agreement with the geologists of the U.S.S.R. on the exchange of English translations of Russian abstracts in return for abstracts of the non-Soviet bloc coun-

tries. The Abstract Journal would be published monthly.

In the geological sciences there are five abstract or bibliographic services in the U.S. today. None of these services cover geological literature completely, but on the other hand there is considerable overlap. The U.S. Geological Survey publishes *Geophysical Abstracts* and the *Bibliography of North American Geology*. The Geological Society of America publishes the *Bibliography of Geology Exclusive of North America and Geological Abstracts*.¹

Economic Geology Publishing Company publishes the *Annotated Bibliography of Economic Geology*. Abstracts of geological interest may also be found in other journals such as *Chemical Abstracts*, *Ceramic Abstracts*, *Monitor*, *National Petroleum Bibliography*, and others.

A broad, there is the Russian abstract journal which now publishes annually more than 12,000 informative abstracts on geological literature of the world. Mineralogical literature is covered by the British *Mineralogical Abstracts*, and in Germany *Neues Jahrbuch* publishes some abstracts.

Assuming that the International Journal of Geological Abstracts is considered feasible and journal is successfully launched, it is probable that at least some of these services will defer to the more complete coverage afforded by the new journal.

The survey being conducted by the AGI will sample 25 per cent of the geologists of the U.S., Canada, and Great Britain. Elsewhere in the free world the survey will be addressed to the entire geological population. The results of the survey should be available by late 1958.

¹ Published by the GSA for the Member Societies of the AGI.

ABSTRACTS FEDERATION PROPOSED

Scientific organizations engaged in the publication of abstract journals met in Philadelphia, January 29-31, for a conference sponsored by Biological Abstracts with the aid of an NSF grant. Study groups considered problems of common interest, and to aid in the meeting of growing demands upon abstracting services, the formation of a federation of abstract services was proposed. Invited to attend from the geosciences were Mary Rabbitt, Waldo Smith, Earl Ingerson, and Robert C. Stephenson.



AMERICAN GEOLOGICAL INSTITUTE

SERVING THE GEOLOGICAL SCIENCES

OFFICES—303 AAAS BUILDING • 1515 MASSACHUSETTS AVENUE, N.W. • WASHINGTON, D.C.

TELEPHONE—EXECUTIVE 3-8100, EXTENSIONS 470-471

MAILING ADDRESS—2101 CONSTITUTION AVENUE, N.W. • WASHINGTON 25, D.C.

February 7, 1958

1958
OFFICERS

- V. H. HORNBLER
President
F. L. LYONS
Vice President
J. L. GOLDBECK
Past President
R. H. BROWN
Secretary Treasurer
ROBERT C. LINDHORN
Executive Director

MEMBER
ORGANIZATIONS

- American Association of
Petroleum Geologists
American Geophysical Union
American Institute of
Mining, Metallurgical and
Petroleum Engineers
Association of American
State Geologists
Association of Geology Teachers
Geological Society of America
Microseismic Society
Paleogeological Society
Seismological Society of America
Society of Economic
Petrologists and
Mineralogists
Society of Exploration
Geophysicists
Society of Petroleum
Engineers

The American Geological Institute is deeply concerned over the current neglect by the federal government of problems relating to our national mineral security. Minerals and the mineral fuels are the raw material base on which our great scientific and technologic advances have been founded. In our current zest to conquer space, the government is unfortunately showing little concern over a strong mineral research policy to match growth and needs of science and technology.

The Administration and Congress have declared themselves all out for science and technology and are voting vast sums for research. Yet the U.S. Geological Survey, one of the oldest and most respected government research organizations, is facing in the next fiscal year beginning July 1 a material decrease in the funds available for its research programs in the mineral resources field.

In government, the geological scientists charged with our mineral research efforts are being relegated to the role of "second rate scientists" along with biologists and other minority groups of scientists who have not benefited from pay increases granted most scientists and engineers. The high morale of geologists in government service is being adversely affected by this discriminatory practice and a general loss of scientific prestige is resulting. Recruiting of geological scientists of high capability has become increasingly difficult and some of the more promising men in government service have left to enter industry. Continuation of such discriminatory personnel practices on the part of government are certain to seriously impair the future recruitment and training of geological scientists to cope with our increasingly complex mineral needs of the future.

Despite the fact that geoscientists in government service have not been given increases granted other scientists and engineers, it may be pointed out that geologists and exploration geophysicists rank second among all of the scientific professions in average salaries. Salaries paid geological scientists in government have become less and less competitive with those paid in industry, particularly since 1953, as shown by a salary survey published by the Institute. Great responsibility rests on the profession in maintaining adequate supplies of mineral resources to meet the ever growing industrial demands of our nation.

At a time when we are trying to outrun the U.S.S.R. in the conquering of space, we apparently are losing sight of their advances on other science fronts. Russia is reported to have as many or more geologists than the U.S. and their current geological research efforts are much greater than ours.

The American Geological Institute urges that our nation take positive and immediate steps to correct the current imbalance plaguing the geological scientists and geological research. Our mineral future must be secure if science and technology are to advance.

OPERATING UNDER NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

STRESS
these points
to
CIVIL SERVICE
COMMISSION

Above is the text of a letter sent by the American Geological Institute to Dr. James R. Killian, Scientific Advisor to the President; the Secretaries of Defense, Health, Education and Welfare, and Interior; the Chairman of the Civil Service Commission; the Chairmen of the House and Senate Committees on Civil Service, Government Operations and Interior and Insular Affairs; and Dr. Alan T. Waterman, Director of the National Science Foundation.

The effective expression of opinion by the geological profession can best be voiced individually or by local groups through the members of the U.S. Congress representing your area. Communications can also be effective if directed to:

DR. JAMES R. KILLIAN
*Special Assistant to the President for
Science and Technology*
White House, Executive Office Building
Washington 25, D.C.

SENATOR JAMES E. MURRAY, *Chairman*
Senate Interior & Insular Affairs Committee
Senate Office Building, Room 224
Washington, D.C.

DR. HARRIS ELLSWORTH, *Chairman*
U. S. Civil Service Commission
Washington 25, D.C.

THE HONORABLE FRED A. SEATON
Secretary of Interior
U. S. Department of Interior
19th and F Streets, N.W.
Washington 25, D.C.

CONGRESSMAN CLAIR ENGLE, *Chairman*
House Interior & Insular Affairs Committee
New House Office Building, Room 1324
Washington, D.C.

USGS PROBLEMS

Should be concern of entire profession

The Federal Government is the largest single employer of geologists and geophysicists, so problems of this segment of the profession are problems of the entire profession. The U.S. Geological Survey, of course, is the agency employing the largest number of geologists.

The U. S. Civil Service Commission, under provisions of Section 803 of the Classification Act, during the past year, has granted salary increases to practically all scientists in government service. The increase was extended only recently to include exploration geophysicists. Only geologists and biologists among the major scientific and engineering disciplines have so far been deprived of this salary increase, which is intended to ease recruiting and retention of personnel. Geologists have not been given a salary increase since March 12, 1955.

The Civil Service Commission in granting increases to most scientific disciplines—but not geologists—has created a very difficult personnel problem for the U.S. Geological Survey. Approximately half of the Survey's scientific personnel are classified as chemists, physicists, geophysicists, or engineers and have been granted salary increases. The resulting salary discrimination is hurting the geologists of the staff, and the traditionally high morale of the USGS is being shaken. Since 1953, when the gap between government and industry starting salaries became appreciable (*GeoTimes*, October 1957), the government has failed to attract its proper proportion of the top quality geology graduates, and many established research geologists have been lost by the Survey to industry because of wide salary differences.

The USGS is also having budget troubles which are expected to get worse before getting better. When the Atomic Energy Commission cut back on its exploration program, the Survey lost substantial funds received by transfer from the AEC. The resulting adjustment by the Survey was difficult for organization and personnel alike. An even more serious blow to the Survey's program is shaping up for the fiscal year 1959, when, if the proposed budg-

et is adopted by Congress, \$1.5 to \$2 million will be lopped from the current level of Survey appropriation.

If USGS funds are cut so severely for 1959, the obvious consequences are likely to affect the entire profession. The Survey will be hiring few, if any, geologists and geophysicists and may even be forced to reduce its scientific staff--this at a time when employment conditions in the profession are already soft. Furthermore, the curtailment of the Survey's program will hit all geologists where it hurts, for the already inadequate program of basic mapping and basic research which benefits all geologists will undergo still further curtailment.

The Administration and Congress are currently going all out for science and technology, particularly when related to missiles, satellites, and space. The national concern of the post-war years over the future of our mineral resources has been all but forgotten despite the fact that minerals are the vital foundation for technological advances. The current plight of the Survey is one evidence of this trend. The profession should be concerned over the current situation, not only for its own welfare, but also because of its responsibilities to society.

NEW OFFICERS

Below are listed the new officers for the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists.

AAPG

President: George S. Buchanan

Past President: Graham B. Moody

Vice President: Gordon I. Atwater

Secretary-Treasurer: Harold T. Morley

Editor: Sherman A. Wengard

SEPM

President: Gordon Rittenhouse

Past President: R. V. Hollingsworth

Vice President: W. M. Furnish

Secretary-Treasurer: Raymond E. Peck

Editor: Journal of

Jack E. Hough

Co-editor: Journal of Pa

MANPOWER *in a column —*

 By HOWARD A. MEYERHOFF
*Scientific Manpower Commission**
*1507 M Street, N.W., Washington 5, D.C.

A cynic is rarely popular, but for a person who must follow the course of manpower events closely, it is difficult not to become one.

During the life of the 84th Congress, there were acute shortages of scientists and engineers. At least two score of bills were introduced, ostensibly to correct the shortage; but the committees charged with the responsibility for this type of legislation held no hearings, took no action, did nothing. Many of these bills were reintroduced into the 85th Congress, and some new ones were added. Still no action.

Meanwhile, the manpower situation eased. Thanks to the Critical Skills Reserve Program, made possible by the Reserve Act of 1955, and thanks also to low induction calls and a large military manpower pool—not to mention larger numbers of graduates in science and engineering—the demand for, and the supply of scientists and engineers were more nearly in balance during the summer of 1957 than they had been since the outbreak of hostilities in Korea.

Enter, Sputnik. A pedestal was quickly rolled out of storage, dusted off, and science and technology were mounted upon it. On not the best of authority, we understand that there is "*now one manpower bill for every Congressman, and two on Sundays.*" Whatever the number, the vast majority of them are designed to entice more young people into science and engineering at a time when our major problem is to find room for them in our bulging institutions of higher learning, to say nothing of finding the faculty to train them. No thought is being given to what can be and will be done with them, either in industry or in government, after they are trained.

Now comes the Explorer. We wonder whether we may anticipate the usual course of events. Will our public officials—and the public—conclude that our honor has been vindicated and, the crisis past, turn to the next problem? Or will the Explorer restore us to sanity and give us better perspective on the job to be done?

The Scientific Manpower Commission has been repeatedly asked for advice, information, and guidance. From cynicism

Popular Geology in Print

• * • by Mark W. Pangborn Jr.

Quite the handsomest picture book to ever pass before this reviewer's fascinated eyes is *PREHISTORIC ANIMALS*, by Czech paleontologist Joseph Augusta and painter Zdenek Burian (Tudor, 1957, \$7.95); in its a rather heavy-footed text and 80 plates, most of them in beautifully registered color, trace the history of life from the Cambrian.

Close behind, artistically, is *William E. Scheele's PREHISTORIC MAN AND THE PRIMATES* (World, 1957, \$4.95), which features dramatic black-and-white drawings of our near relatives and ancestors; despite some poor editing, this volume is a fitting successor to Scheele's earlier picture books, *PREHISTORIC ANIMALS* and *THE FIRST MAMMALS*, and will delight anyone age 10 up.

Man's physical evolution is more authoritatively, if less spectacularly, summarized in W. E. Le Gros Clark's concise HISTORY OF THE PRIMATES; AN INTRODUCTION TO THE STUDY OF FOSSIL MAN (U. of Chicago Press, 1957, \$1.25). Two other expert popularizations are PREHISTORIC MEN, by Robert J. Braidwood (Chicago Natural History Museum, 1957, \$1.25), which emphasizes tools and technologies, and MAN: HIS FIRST MILLION YEARS, by Ashley Montagu (World, 1957, \$3.75), a primer of physical and cultural anthropology stressing the evolution of human society.

A useful handbook for the beginning adult and older children is *Richard Casanova's AN ILLUSTRATED GUIDE TO FOSSIL COLLECTING* (Naturegraph Co., San Martin, Calif., 1957, \$1.50); most of the 78 pages are devoted to a classification of fossils; a history of life, and a list of collecting localities; many pictures. How LIFE BEGAN, by *Irving Adler* (John Day Co., 1957, \$2.95), is a readable, meaty account of the chemical origins of life, which will appeal to the serious high school student and adult. *Dorothy E. Shuttlesworth's REAL BOOK ABOUT PREHISTORIC LIFE* (Garden City Books, 1957, \$1.95) is a vividly-written, fairly well illustrated history of life on earth for ages 9 to 13.

we turn to optimism. Perhaps the Explorers will assist us in injecting some sound thinking into Federal policies affecting scientific and engineering manpower.

3 Based on hundreds of redcarcass dates. "Determinations by age from
strontium method. Tephrochronology for central North America; Stratigraphy for Alps. Pleistocene marine stages also are recognized. Out-
classifications are established for continental and Pacific Coast units.

ט'ז

GEO TIMES

Geologic Column and Scale of time
The tables of *stilts* data sheet were prepared by Chester R. Longwell in cooperation with the Data Sheet Committee of the American Geological Institute. The lithologic data were selected and checked by A. Koepp.

NEW AGI DATA SHEET

**Produced by
Data Sheet
Committee**

The above data sheet is the first to be produced through the efforts of the AMERICAN GEOLOGICAL INSTITUTE DATA SHEET COMMITTEE composed of the following members: *Richard M. Foose*, Chairman, Stanford Research Institute; *John E. Allen*, Dept. of Geology, Portland State College; *William Beatty*, Stanford Research Institute; *Chester Longwell*, U.S.G.S., Menlo Park; *Vincent McKelvey*, U.S.G.S., Menlo Park; *George Thompson*, Dept. of Geophysics, Stanford University.

The Data Sheet Committee has drawn up Data Sheet 5, *Geologic Column and Scale of Time* for presentation in GeoTimes without having submitted it for approval to the American Committee on Geologic Nomenclature or to any other major geologic organization. Although names and correlations have been carefully reviewed, some disagreements might be expressed over correlation of series with stage and age and with geographic terminology. The committee thinks these will be minor and will not impair the usefulness of the chart, but welcomes constructive criticism or suggestions that might be incorporated in a later revision.

OTHER DATA SHEETS

Nos. 1-3—GEOLOGIC MAP SYMBOLS
(Special price to educational institutions of \$0.15 per set of 3 in quantities of 10 sets or more)

Price (set of 3) \$0.25

No. 4—AVAILABILITY OF PUBLICATIONS AND OTHER DATA OF THE U. S. GEOLOGICAL SURVEY

Price \$0.10

No. 5—GEOLOGIC COLUMN AND SCALE OF TIME

Price \$0.10

Send cash with order to
AMERICAN GEOLOGICAL INSTITUTE
2101 Constitution Ave.,
Washington 25, D. C.

GEOPHYSICS ESSAY CONTEST

The annual world-wide geophysical essay contest conducted among college students by the Society of Exploration Geophysicists was announced today by Dr. Charles W. Oliphant of Tulsa, Oklahoma, chairman of the contest committee. A cash prize of \$150 will be awarded the first place winner, Dr. Oliphant said, with \$100 for second and \$50 for third prize. To be eligible the essay must be written by a graduate or undergraduate college student who has had or is now taking at least one course in geophysics. Detailed rules of the contest may be obtained by writing to *Dr. Oliphant at 1905 National Bank of Tulsa Building, Tulsa 3, Oklahoma.*

ERA and PERIOD	SYSTEM	VARIED SURVEY DIVISIONS		ABSOLUTE AGE (IN MILLIONS OF YEARS) ^a
		SERIES AND EPOCH	STAGE AND AGE	
Penns.	North American	Not established	Not established	220 ^b
	Quaternary	Not established	Not established	
	Lower Laurentian	Not established	Not established	
Wolcamps	Central North America	Not established	Not established	270 ^b
	Missouri	Not established	Not established	
	De Mores	Not established	Not established	
Mississippian	Mississippi	Not established	Not established	
	Chattanooga	Not established	Not established	
	Ohio	Not established	Not established	
Carboniferous Systems	SEASIS AND BOCCHI	Not established	Not established	
	Eastern United States	Not established	Not established	
	Betheltonian	Not established	Not established	
Devonian	Chattanooga	Not established	Not established	
	Saukian	Not established	Not established	
	Saukian	Not established	Not established	
Silurian	Brianian	Not established	Not established	
	Ulsterian	Not established	Not established	
	SEASIS AND BOCCHI	Not established	Not established	
North American	Cayuga	Not established	Not established	
	Niagara	Not established	Not established	
	Astion	Not established	Not established	
Cretaceous	North American	Not established	Not established	375 ^c
	Clarendonian	Not established	Not established	
	Albian	Not established	Not established	
Cambrian	Mayellian	Not established	Not established	
	Edianian	Not established	Not established	
	Champlainian	Not established	Not established	
Ordovician	Edianian	Not established	Not established	
	Laurentian	Not established	Not established	
	Canadian	Not established	Not established	
Cambrian	Upper (Lata)	Not established	Not established	440 ^d
	Middle (Baltic)	Not established	Not established	
	Lower (Lata)	Not established	Not established	
Precambrian	Lateral Precambrian (^e)	Not established	Not established	470 ^d
	(Night to Mountains, Okanagan)	Not established	Not established	550
(No bases for world-wide divisions)				
Keweenawan Group	North American	Not established	Not established	1,100 ^b
	Keweenawan Group	Not established	Not established	
	Pre-Keweenawan	Not established	Not established	
Autumnal Group	Autumnal	Not established	Not established	1,700 ^b
	Algonkian	Not established	Not established	
	Wabigoon	Not established	Not established	
Keweenawan Group	Wabigoon	Not established	Not established	2,300 ^b
	Wabigoon	Not established	Not established	
	Autumnal	Not established	Not established	
Ogallala Group	Ogallala	Not established	Not established	2,700 ^b
	Ogallala	Not established	Not established	
Keweenawan Group	Keweenawan	Not established	Not established	3,310 ^b
	Southern Rhodesia	Not established	Not established	

Determined by lead-uranium method; 2 By argon method; 3 By strontium method. The radiogenic ages were selected and checked by A. Knopf. Two or more provincial divisions are extended widely in North America. Divisions in Western Europe differ somewhat from those in Russia.

and sources of information on terminology in these tables are: Correlation charts and articles by sections of Committees on Terminology, National Research Council and published in *Terminology* (Am. Philos. Soc.).



A gift of \$1,000 was presented recently by the Tulsa Geological Society to the Department of Geology of Tulsa University. Pictured above are J. E. Upp, who on behalf of the Tulsa Geological Society is presenting a check to Dr. A. N. Murray, Chairman of Tulsa U. Geology Department (center), while TGS President Parker A. Dickey looks on.

The gift of \$1,000 will be used by the Department for the purchase of needed equipment for the mineralogy and petrography laboratories. The gift was made possible from income resulting from the regional meeting of the AAPG held in Tulsa last Fall and sponsored by the Tulsa Geological Society. Arrangements for that meeting were under the direction of Mr. Upp who presented the check. Dr. Dickey made the following comments at the time of the presentation:

"For many years the University of Tulsa has provided a meeting place for our society. Its members, therefore, are particularly

TULSA UNIVERSITY

**Receives gift
from geologists**

conscious of what the University means to us as geologists and as residents of Tulsa.

It provides a fine curriculum of studies for our children, many of whom are attending as students, and brings to Tulsa a large number of fine young people, 90 from foreign countries. The faculty provides a group of public-spirited citizens that contribute immensely to the community. The strong departments of Music, and of Religion and Philosophy, for example, mean a lot to some of us. It elevates the academic, scientific, and cultural level of the City.

"Geology is our living, our vocation and avocation. We owe a lot to the science. We feel the obligation to contribute to it personally, to help the teachers, and to encourage and help the students. We feel a particular affection and responsibility to you, Dr. Murray, and to your colleagues.

"It is a source of great gratification to be able to present to you this check for \$1,000 as evidence of our feeling of obligation to the University, to the Department of Geology, and to you personally."

WATERWITCHING —Continued from page 7

that witching is merely a superstitious survival from the past. It would lead us to predict that the proportion of wells that are witched is a constant from community to community.

The "They-can't-go-wrong" theory. This theory proposes that witching survives in communities where water is easily accessible because the consumers never realize that they could be just as successful in locating water without the aid of the dowser. The prediction here would be that the proportion of witched wells will be higher in those communities where it is easy to locate underground water.

The ritual theory. This theory, based upon anthropological concepts concerning magic and ritual in primitive societies, views witching as a ritual that is practiced in the face of anxiety and uncertainty about the outcome of a well sinking. The theory predicts that the proportion of witched wells will be higher in those communities where the location of underground water is difficult and involves risk.

The "nothing better" theory. This theory states that people turn to waterwitching because they have no better alternative. It predicts that the proportion of witched wells will be higher in those communities where the information about groundwater conditions is poor or inadequate.

Our empirical survey was aimed at deciding, if possible, which of these theories is correct. Fortunately, the results were fairly clear-cut. First we equated counties for size, degree of urbanization, number of wells developed each year, and population. Then we compared counties that were high on witching activity with those that were low. The counties that had a lot of witching were those in which the location of underground water was a serious problem (either because of tremendous variability in depth, variations in quality and amount of water, or high proportion of dry holes) and in which information concerning underground water was inadequate.

These empirical findings, then, are in line with both the ritual and the "nothing better" theories. People turn to the waterwitch when they have no other source of information and when they are uncertain as to whether a particular well site will yield the desired amount of water at a reasonable cost.

Some users of waterwitching even try to make out a quasi-rational case for their decision. They argue that in many situations expert advice is lacking or inadequate because of the peculiar geological situation.

They turn to the witch because even if witching is invalid, the witch's judgment cannot be worse than their own. So they have little to lose (if there is nothing to witching) and a lot to gain (if there is something to witching).

As one Nebraska agent put it, "Farmers drilling an irrigation well feel that the \$5 to \$25 fee is so small compared to the \$3,000 to \$15,000 investment that they do it even though they aren't sold on it." And an Iowa respondent told us, "Not too many have faith in witching, but use it in the absence of any other method of locating water."

What do our findings portend for the future of waterwitching in the U.S.A.? Witching persists under those conditions where the choice of a well site involves uncertainty and anxiety. Each choice involves the possibility of finding water at a reasonable cost, finding water at a prohibitive cost, or finding no water. It is when the situation provides few objective guides for minimizing the probability of the latter two alternatives that the individual calls in the witch. The witch relieves the individual from the responsibility of making a choice under such uncertain conditions. And even if the witch's choice ultimately proves to be an unfortunate one, he still has provided some relief at the time of the selection and he has absolved the individual from any blame. It is the fact that the dowser provides certainty at the time of choice, we believe, that makes him so appealing to the rural consumer.

Consequently, we feel that waterwitching will persist in this country as long as individuals must choose well sites under conditions where they have few external guides as to which of several possible sites will minimize their chances of paying heavily for the water they need.

PHOTOGEOLOGY PANEL

The American Society of Photogrammetry will hold its annual meeting jointly with the American Congress of Surveying and Mapping at the Shoreham Hotel, Washington, D. C., March 23-29. A photogeology panel will be held Friday, March 28, and Professor H. T. U. Smith of the University of Massachusetts will be the moderator. The program will include many interesting papers related to developments in surveying, mapping and photogrammetric techniques. Non-members are welcome to the ACSM-ASP meetings. Full program details may be had from *American Society of Photogrammetry*, 1515 Massachusetts Ave., N.W., Washington, D. C.



URANIUM IN SOUTH AFRICA 1946-1956.
A Symposium arranged by the Associated
Scientific & Technical Societies of South
Africa: volume 1, 546 pages, volume 2,
483 pages, 1957; published by Horvers
Limited, Leader Building, Simmonds
Street, Johannesburg, South Africa,
\$16.00.

This is a two-volume collection of papers giving a comprehensive survey of the geological and engineering phases of the South African uranium industry. Together with a foreword by the South African Minister of Mines and an introduction by the President of the Transvaal and Orange Free State Chamber of Mines, there are 30 papers, most of which have been published previously in technical journals.

The first paper is a historical review of the development of the South African uranium industry. The next 3 papers are devoted to the geology and mineralogy of the South African gold-uranium deposits; one of these, 199 pages long, discusses fully the occurrence and origin of the gold and radioactive minerals, based on detailed laboratory studies. The following 25 papers describe in considerable detail: (1) methods used and engineering problems encountered in ore processing and refinement; (2) assay methods; (3) plant design, construction, and maintenance; and (4) production management. The last paper discusses the national and international aspects of the South African uranium industry. A subject and a personal, or author, index are given at the end of volume 2.

J.K.H.

THE MINERAL AND WATER RESOURCES OF ISRAEL (in English). Israel Economic Forum, Vol. 6, No. 3, March 1955. Published by the Ministry of Commerce and Industry, Div. of Econ. Publications, Jerusalem, Israel.

A comprehensive survey of mineral resources of Israel by members of the Geological Institute of Israel and others, aimed at local and foreign investors. All papers include a discussion of the potential economic exploitation of the minerals. The Israel Mining Law is included in the appendix. Some revisions may be required because of several important mineral discoveries made after the publication of this issue.

T.M.

THE LIVING ROCKS: an album of photographs by Stevan Celebonovic, with a commentary by Geoffrey Grigson, and a preface by Andre Maurois; translations by Joyce Emerson and Stanley A. Pacock. Philosophical Library, 15 East Fortieth Street, New York 16; 94 pages, 1957, \$6.00.

This is the first in a series of albums on Art and Nature and should be of special interest to geologists, both professional and amateur. The book contains 64 excellent photographs, printed full-page (8 x 11 inches), 24 are of minerals and 40 are of fossils. The commentary is geologically informative, including the time scale, but the emphasis is on the artistic merit of geologic specimens. This book should be in most geological homes. It would be an outstanding addition to the reading material in any reception room of distinction.

FUNDAMENTALS OF LOGGING: University of Kansas Student Union Book Store, Lawrence, Kansas; 169 pages, 1957, \$3.00.

This is a symposium comprising seven papers by three authors. The papers were presented at a Petroleum Engineering Conference sponsored by the Department of Petroleum Engineering, Kansas Geological Survey, and the University Extension Service. The authors are M. P. Tixier, Maurice Martin, and Jay Tittman—all of Schlumberger Well Surveying Corporation.

The first five papers (114 pages) are concerned with the principles and applications of electrical logging. These are followed by two papers (40 pages) on the principles and applications of radiation logging. There is a brief paper on summary and conclusions by Tixier at the end of the volume. Each paper contains a selected bibliography. There is no index of the volume.

The papers present a thorough introduction to the principles of electric and radiation logging which should be of value to anyone attempting to use such logs. The authors make extensive use of diagrams and charts. These are full page (8 x 11 inches), clearly drawn and fully labeled, and they comprise 82 of the 169 pages in the volume.

Little "George" Times asks...

Did you send in the green envelope from the February issue to help keep him going?

GEOLGY in the Public Eye

by
Robert L. Bates

At least one state survey, that of Minnesota, is actively interested in discouraging exploration for oil—or at least in preventing residents from putting any more thousands into dubious promotion schemes. Recently Dr. George Thiel prepared non-technical reports on the subsurface geology of 15 western and southwestern counties, and these were then distributed to local newspapers via the University's news service. The reports included maps, sections, and 3-D diagrams. They must have appealed to the editors—every one was published in at least one county newspaper. According to Dr. G. M. Schwartz, the gratifying result has been that "no drilling for oil has been done in that area since the reports were published."

If there be any among you who would like to see Dinosaur National Monument made into our 30th National Park, write to Sen. Gordon Allott (Senate Office bldg., Washington 25), indicating your support of Bill S-2577, which he has introduced. The last park in the U.S. proper was created 10 years ago, when annual attendance totalled less than 26 million; this year it will be 60 million. Every additional area will reduce the load on the others. Dinosaur includes 325 square miles of spectacular scenery along the canyons of the Green and Yampa rivers, and a better locality can hardly be imagined for presenting matchless geological wonders to the public. (While you're at it, send a carbon of that letter to your own senators.)

Bob Laurence of the USGS at Knoxville reports that the recent uranium hoax made front-page news in the land of the well-known Chattanooga shale, and that so far as he knows no local paper has printed any retraction. He had a phone call from a gentleman who had witnessed the recovery of U_3O_8 from black shale in 40 minutes, in a portable plant. This demonstration is reported to have taken place in Columbus, Ohio, of all odd places.

The Pennsylvania survey will now furnish rock and mineral sets, of two voltages: one for students and scouts, one for teachers and scout leaders. Makes sense, doesn't it? Free to state residents, cost of mailing elsewhere.

If you have a story on Geology in the Public Eye, write: Dr. Bates, Dept. of Geology, Ohio State University, Columbus, O.



ROCK CHIPS

by SANDSTONE SAM

In an exam in Field Geology a precocious geology major who had had summer experience with a field party, wrote the following in answer to the question "How would you measure the height of a cliff with an altimeter?"

There are four ways to measure the height of a cliff with an altimeter. These are:

1. Tie a string to the altimeter and lower it from the top of the cliff to the base, then measure the string.

2. Measure the thickness of the altimeter, then place the instrument against the wall of the cliff, mark the top with a pencil, raise bottom to pencil mark and repeat procedure until top of cliff is reached. Tally the number of marks and multiply by the measured thickness of the altimeter to get the height of the cliff.

3. With accurate stop watch in hand, drop altimeter from top of cliff and time its descent to base. Apply the standard formula $S = \frac{1}{2}gt^2$.

4. (and least accurate) Read elevation from altimeter at base of cliff and read elevation again at the top of the cliff. The difference should equal the approximate height of the cliff.

* * *

"Das Paleontologischer ist ein Fossil geknocker mit der low gedraggin' Pugidum."

* * *

Present is the key to the past. It depends, however, whether you have the right key . . . A first year student thought he had it when he wrote this example in a test paper:

. . . Today we have rats.
. . . Fossils show horses descended from rats.
. . . 2000 years ago we had cats the same as today's.
. . . Therefore it must have taken millions of years for horses to evolve from cats!"

Sandstone Sam says...

If you didn't, you should tuck \$2 or more in that green envelope and drop it in the mail TODAY!



DEAR EDITOR:

In answer to the article *Earth Scientists in the Air Force* (GeoTimes, December 1957), I would like to unfold the story of five geologists currently in the U.S. Army as enlisted men. Lt. Dott was good enough to mention the agency where these men are stationed, The U.S. Army Map Service, Far East.

Perhaps the best way to present the story of these men would be to describe the activities of each one at this precise moment. I am sitting at my desk, and from this position I can observe the movements of each of the other geologists.

Directly opposite my desk is Specialist 3/C Bill Edmunds, B.S. and M.S. in Economic Geology. He is reading the dictionary because he has nothing else to do. He is not too happy this morning because we had C-Rations for breakfast and he was on the latrine cleaning detail before we came to work.

Directly to my right is PFC Tony Cerkel, B.S. in Geology. He is playing a very interesting word game with one of the Department of the Army civilians. The project they were working on was dropped two months ago, and they have no work to do.

Farther to my right, past PFC Cerkel, is PFC Ron Kronheim, B.S. in Economic Geology. He is reading a book on psychology that he borrowed from one of his room mates. His project has also been discontinued.

At the rear of the office I see PFC Jack Shepard, B.S. in Geology, making an inventory of our library. He was pulled off his project two weeks ago to assist the library branch in their inventory of the library, a project that is scheduled for completion in two and one half months.

As for myself, I hold the degrees B.S. and M.A. in Petroleum Geology. I, of course, am writing this letter at the present time. My project was completed in early October, and I have not been given a new project as yet. I will spend my time today reading books and writing letters home.

Tonight we will pass the evening preparing for the inspection that occurs each Saturday. The Colonel will check each man to be sure that his brass is shined and his shoes are polished. No one has ever inspected the maps we make.

This description may appear to be exaggerated, but it is not. It is typical of our daily routine. Lt. Dott was only aware of the fact that the organizational chart of Army Map Service called for geologists. What he did not know is that they actually have no work requiring the skills of a geologist.

Yours for a better Army,

PFC ROBERT E. LONG, US 56 282 007
8055 A.U., U.S. Army Map Service,

Far East APO 500, San Francisco, Cal.
Tokyo, Japan
17 January 1958

DEAR EDITOR:

During the past year I have received numerous letters inquiring as to why I stopped writing summaries of the Russian geological articles in the AAPG Bull. and AGU Transactions. Inasmuch as it is practically impossible for me to answer all these letters, I will appreciate it a great deal if you could publish my reply in your popular magazine.

I have stopped writing because the above-mentioned magazines stopped publishing my summaries. I was told that they prefer to publish original articles. I am in no position to argue the point, and therefore, this letter is written for informational purposes only.

It should be kept in mind, however, that the existing state of affairs is simply not fair. Russian geologists know what we are doing through a well-organized government translation agency, whereas in the U. S. we are almost unaware of their work. An outstanding Russian geologist told me in Mexico City in 1956 that they will get ahead of us, if we continue to neglect their works. He also mentioned that there is a considerable amount of duplication of effort on our part, whereas they take off where we stop.

I realize that we are trying to correct the existing situation to some extent, such as the commendable effort of AGU. However, in comparison to their efforts in that direction, all our efforts seem puny. I tried to do my best by publishing some 60 summaries and I am indeed grateful to those of you who appreciated it.

GEORGE V. CHILINGAR, Ph.D.
University of Southern California

DEAR EDITOR:

As a follow-up of the article on Earth Science in the January issue of *GeoTimes*, I would like to add that since the publication of that article I have completed a survey of the teaching of earth science in New York State (except N. Y. City) for the 1957-58 school year, and these figures show an even greater interest in the subject than those of the 1956-57 year, which were the figures listed in the article.

The number of schools teaching earth science to selected ninth grade pupils in place of the regular ninth grade general science has increased from 94 in 1956 to 133 this year, and the number of classes has increased from 117 to 169. Inquiries to date indicate that the increases will be even greater another year.

Looking at the earth science picture from the standpoint of all the grades (9 through 12) in which the subject is taught the last five-year period (1953-1957) shows that the number of schools offering earth science (a full year subject) has increased 109%, the number of earth science classes has increased 144%, and the number of students taking earth science has increased 189%.

The increased enrollments mentioned above may well indicate a revival of interest in the earth sciences (geology, astronomy, meteorology) at the secondary school level. Offering earth science, normally a senior high school subject in this state, to ninth grade pupils, who have been "selected on a basis of drive, interest, aptitude and previous performance in science may be one way of challenging our most able pupils, without adding to their schedules and also without increasing the teacher load. Only favorable criticism of this plan throughout the state during the nine years that the program has been in effect has been received."*

*Quoted from THE SCIENCE LETTER, June 1957. Hugh Templeton, N. Y., State Supervisor of Science.

DONALD B. STONE
Earth Science Instructor
Mont Pleasant High School
Schenectady, N. Y.

EDITOR'S NOTE: Don Stone has received a number of letters as a result of his article in *GeoTimes*, January 1958. People from such widely separated areas as Texas, Massachusetts, Virginia, and Michigan have asked for information on Earth Science courses in secondary schools. Now, if we could only get some science teacher training courses by geology departments . . .

DEAR EDITOR:

I am writing to thank you very much for the very effective little article you put in for us in the January issue. The response began some days before my copy arrived and I had a chance to see the article. I have already received one or two generous offers of mineral specimens and a few book offers. It is not to be expected that books would be available forthwith but I should anticipate that we shall profit greatly in that direction as time goes on. At any rate you have fairly placed us on the map.

It would be nice if there were some way in which we could reciprocate your kindness.

Sincerely yours,

JOHN D. WEAVER
University of Puerto Rico

DEAR EDITOR:

I want to offer a hearty endorsement of Mr. R. L. Bates' observation in the January issue, on professional licensing of geologists. Any practicing geological consultant can probably furnish many instances of abuses similar to those cited by Mr. Bates.

This matter of licensing has been kicked around now for many years. It is encouraging to note that the *GeoTimes* will publish favorable evidence on this subject. When, if ever, is the Institute's committee going to get off its dime and come up with a constructive recommendation on the subject?

Very truly yours,

FRANK B. CONSELMAN
Abilene, Texas

SCHOOL LECTURE SERIES
Staged by CSEG

The Canadian Society of Exploration Geophysicists has conducted a lecture program this winter for the students of the junior and senior high schools of Calgary. Members of the society developed a series of three lectures on the following subjects: *Basic Geophysics*, the *International Geophysical Year*, and *Geophysical Exploration for Oil*. The three lectures were given by members of the society at 14 Calgary schools and on February 7 were presented before a convention of Alberta teachers. The lecture series was developed for the C.S.E.G. by a committee consisting of H. J. Kidder, Chairman, Carl Chapman, Ralph Ross, Milton Dobrin, and society president George Blundun.

NEW Ideas Products Services

POLYETHYLENE FLASKS: Chemically resistant 500 cc. filtering and Erlenmeyer flasks of high temperature polyethylene, sufficiently heavyweight to withstand vacuum and normal laboratory use are now produced by PALO LABORATORY SUPPLIES, INC., 81 Reade Street, New York 7, N. Y.



Say You Saw It In GEO TIMES

DRILLING EQUIPMENT INSURANCE for on shore and off shore locations in Central and South American countries is the specialty of a newly formed company, SOUTHERN OVERSEAS UNDERWRITERS, INC., Audubon Building, New Orleans, La.

Say You Saw It In GEO TIMES

X-RAY INFORMATION. A new 16 page booklet "Questions and Answers on Diffraction, Diffractometry and Spectrography" describes fields of application of the three basic X-ray analysis methods and gives much helpful information. The booklet is free on request from PHILIPS ELECTRONICS, INC., 750 South Fulton Ave., Mount Vernon, N. Y.

Say You Saw It In GEO TIMES

pH Krr includes 5 portable pH instruments with carrying cases and buffer solu-



tions, 2 buffer kits, 2 extra probes and 2 sets of batteries. Available from ANALYTICAL MEASUREMENTS, INC., Chatham, N. J.

Say You Saw It In GEO TIMES

CARACAS DATA PROCESSING CENTER for semi-automation in processing seismic data, available for use by oil companies and geophysical contractors, has been established in Caracas, Venezuela, by GEOPHYSICAL SERVICES, INC., Dallas, Texas.

aStratex "spec" for scientists!

YOUR BRUNTON'S* AS BASIC AS BEDROCK!



Bearings and Azimuth—Dips and Strikes—Slopes and Elevations—all one, to new Brunton.



\$49.50
in U.S.A. and
Canada
Level Belt
Loop Case
\$4.50.



9 oz. for
pocket or belt, instant
declination adjustment —
Brunton's® an alidade,
clinometer, compass, level, transit
and plumb — dandy for shaving too.
More, it's a necessity! INSIST ON ...

AINSWORTH—NO ONE ELSE MAKES

BRUNTON'S®

*T. M. Registered
WANT LITERATURE?
Dept. G

STRATEX INSTRUMENT CO.

3515 SUNSET BLVD. LOS ANGELES 26, U.S.A.



EARN EXTRA MONEY



- AMAZE your FRIENDS
- CUT GEMS
- MAKE JEWELRY
- at HOME

BIG PROFITS CAN BE YOURS with this FASCINATING NEW HOBBY. We show YOU HOW!

50¢ in coin or stamps BRINGS YOU postpaid THREE BIG VALUES LISTED. Please BE SURE to mention "DEPT NUMBER" below when ordering.

1 An illustrated 120-page book on Gem Cutting and Guide to "Where To Find Gems" in 48 states. Cover is in color.

2 Catalog on Gems, Jewelry Parts, Machinery, Tools and Materials for Gem Cutting and Jewelry Making. It tells you how to obtain our 240-Page Hobby Catalog.

3 A bag of Polished Baroque Gems—Retail Value \$1.00.

IF NOT SATISFIED, return for 75¢ CASH REFUND.

— Dealer Inquiries Welcome —

GRIEGER'S Dept. No. 203
1633 E. WALNUT ST. PASADENA, CALIF.

CLASSIFIED ADS . . .

	1 ti.	3 ti.	6 ti.	12 ti.	
POSITIONS WANTED	\$0.25	—	—	—	per line
VACANCIES	2.00	1.35	—	—	per line
SERVICE-SUPPLIES	2.00	1.35	—	—	per line
CONSULTANTS	2.00	1.35	—	—	per line
ONE INCH BOX	25.00	22.50	21.25	20.00	

Min. Charge \$1.00. AGI box numbers \$1.00 extra. No discounts. All classified advertisers will be billed, do not send advanced payments. Address all communications to American Geological Institute, 3101 Constitution Ave., Wash. 25, D. C.

VACANCIES

WICHITA UNIVERSITY, Wichita 14, Kansas. Rank and salary dependent upon qualifications. Ph. D. to teach mineralogy and related courses. Write J. R. Berg, Dept. of Geology.

THE RESEARCH COUNCIL OF ALBERTA invites applications for the following geological positions:

- 1) Surficial and groundwater studies in southern Alberta—Ph.D. in Pleistocene or Engineering Geology
- 2) Assistant in micropaleontology laboratory—B.A. or B. Sc.
- 3) Coal geologist to assess Alberta's coal potential with special reference to outlining areas of large reserves of low cost coal—M.Sc. or Ph.D. in Economic geology, stratigraphy, or Engineering geology

Salary and rank in these positions commensurate with training and experience. Applicants are requested to send a record of training and experience, recent photograph, and names of three referees to: Secretary, Research Council of Alberta, 87 Avenue and 114 Street, Edmonton, Alberta, Canada.

WOMAN WITH DEGREE IN GEOLOGY particularly adept at writing and editing reports. Essential that English and grammar be excellent. Wide variety of geologic interests and abilities desired. Large nonmetallic company headquartered in Rocky Mountain region. Position will involve handling of funds and coordinating work in small office. Box 87.

MARIETTA COLLEGE, Marietta, Ohio. Opening September 1958 for qualified instructor to teach paleontology, sedimentation-stratigraphy, etc. Apply W. G. Steel, Department of Geology.

APPLICATIONS ARE INVITED for the position of Professor and Head of Department in Geology, on the scale \$6800-100-8400, to take effect at 1st September, 1958. Assistance towards transfer expenses is contributed by the University. Applications, with complete curriculum vitae, and the names and addresses of three referees should be addressed to the President, Memorial University of Newfoundland, St. John's, Newfoundland, Canada.

THE DEPARTMENT OF GEOLOGY, UNIVERSITY OF ALBERTA, Edmonton, Canada, invites applications for the following position: Mineralogist, Ph.D., appointment at Assistant Professor level with salary dependent on qualifications and experience; a new building provides excellent research and museum facilities.

SCHOOL OF MINES, UNIVERSITY OF ALASKA, College, Alaska. Department of Geology—vacancy for permanent Head of Geology Department. Ph.D., teaching experience and considerable field work necessary; work in glaciology and engineering geology and Alaskan experience desirable. Rank and salary dependent upon qualifications. Begin—September 1958. Contact: Earl H. Beistline, Dean, School of Mines, University of Alaska, College, Alaska.

POSITION OPEN for Fall Semester, 1958, in the field of micropaleontology. Ph.D. required. Rank and salary dependent upon qualifications. Write to Department of Geology, University of Houston, Houston 4, Texas.

POSITIONS WANTED

BOX 359. GEOLOGIST, B.S., 6 years exploration in the Four Corners, Panhandle and West Texas. Experience includes seismograph and administration. Desires more responsibility. Excellent references.

BOX 372. CONSCIENTIOUS teacher, Ph.D. GEOLOGY, seeks unpressured academic environment. Available June.

BOX 389. GEOLOGIST, Ph.D., 49, family. Desires teaching position or administrative-teaching responsibilities in college or university. Interest in sedimentation, petroleum geology, groundwater, sedimentary petrography, stratigraphy, and geophysics. Willing to teach elementary geology, structural geology, "hard-rock" courses, and invertebrate paleontology. 7 years teaching in major university; 16 years experience in petroleum and metals exploration. U.S.G.S. rating of GS-12. Registered geologist. Widely travelled. Excellent references.

BOX 392. GEOLOGIST, BA, married, 3½ years mapping, areal and detailed, metallic and non-metallic mineral evaluations. Photogeology, some geophysics, report writing.

BOX 393. PETROLEUM GEOLOGIST with geophysical background. M.Sc., Ph.D.; 12½ years with major company, 2 years with independent. Experienced in widely separated petroleum provinces. Capable of planning perceptive and aggressive exploration program. Interested mainly in the great potential of the Rocky Mt. province but will consider other areas. Administrative and executive abilities; will carry out land acquisitions and arrange drilling deals. References.

BOX 395. GEOLOGIST, M.A., Ph.D. residence requirements completed, dissertation partially completed; field and teaching experience. Desires teaching position in either Mineralogy, Elementary Geology, Structural Geology or Geomorphology. Single, 26. Available September 1958.

BOX 396. METALS EXPLORATION GEOLOGIST, Ph.D., married. Desires field or research position with progressive company—foreign or domestic; salaried or consulting basis. Principal interest in disseminated deposits, light metals, and sedimentary uranium. Well qualified in field and laboratory mineralogy. References furnished. Available 2 weeks notice.

BOX 397. GEOLOGIST, 29, married, 6 years varied experience in all types of mineral deposits for USGS, state and private employers. Exploration main interest, desires western U.S. or possible foreign position. Excellent references. Presently employed, available on reasonable notice.

BOX 398. WHO NEEDS A 29 YEAR OLD, married exploration geologist with varied mineral deposit experience who can write? Has written articles and reports for all levels of geological interest and knowledge. Open to any attractive offer.

BOX 399. GEOLOGIST-GEOPHYSICIST specializing in water. 37, married. B.S., M.S., geology, credits for D.Sc.; physics minor, calculus, physical chemistry, engineering subjects. Returning from Turkey, Iran, Libya, Spain, Greece in charge of extensive U.S. military water supply programs. 6 years U.S.G.S. Proficient in electrical resistivity, magnetometer, seismograph, air photography-mapping, piloting, supervision, reports. Desire water exploration, exploitation, improvement, or research with industry, consultant, or public organization. Available January.

BOX 404. ECONOMIC GEOLOGIST, PETROLOGIST, Ph. D., actually employed as Visiting

POSITIONS WANTED—Continued

Professor at a well-known institution, desires similar position for next year, or permanent affiliation with a geology department of high professional standards. Will also consider research, exploration, or subsurface work. Has taught all geology subjects with exception of intermediate and advanced paleontology and possessed of functional experience. Very good references and available in June 1958.

GEOLOGIST. B.A., 24, married, 2 children, 3 years grad. study, 4 summers field experience, 3 years teaching experience, desires teaching position in paleontology-sedimentology, prefer position with opportunity to complete Ph.D., 45 Kimball Road, Braintree, Mass.

BOX 416. MINERALOGIST-GEOLOGIST. 37, married, M.S., Ph.D. course work completed, desires position in industrial laboratory or in exploration for mineral deposits. Six years experience in uranium mineralogy and geology.

BOX 417. GEOLOGIST. 35, Ph.D. in June 1958, B.S. in Electrical Engineering, experience with U.S.G.S. Desires teaching position in college or university, preferably in western U.S. Interested principally in structural geology and stratigraphy.

BOX 418. PHYSICAL GEOLOGIST. Ph.D. Columbia University; 27, family; research, teaching, and field experience; good math background; publications. Desires teaching position in university in west U.S. or Canada, with opportunity for research and/or consulting. Will teach undergraduate or graduate courses in physical geography, geomorphology, sedimentology, photogeology, structure, ground water, hydrology, etc. Now teaching at major university. Available summer '58.

BOX 419. PETROLEUM GEOLOGIST. M.A., 13 years varied exploration experience, mainly in Gulf Coast. Wants relocation to Rocky Mountain area, preferably Denver. Administration not necessary.

BOX 420. GEOLOGY PROF. desires to relocate west of 105° W Long. Widely varied background in both education and experience, BA and MS degrees. Want position that affords some research and/or consulting opportunity. Available 1 June 1958.

BOX 421. RESEARCH GEOLOGIST. 28, M.S., married. State survey experience in El Dorado anal. of subsurface stratig. and structure; cartographic and aerial photo experience in Military. Desires position in oil research and/or exploration with independent, major, or survey.

BOX 422. GEOPHYSICIST. Want career position foreign. 7 yrs. seismic experience includes 4½ yrs. independent interpretation, 4 yrs. foreign. Speak fluent Spanish, degree, age 30, married.

BOX 423. GEOLOGIST. 28, vet., single, B.A. 1957, one year's experience U.S.G.S. Desire work in exploration, mineralogy, petrology, or geochemistry, overseas or domestic.

VERTEBRATE PALEONTOLOGIST. (39), "At Liberty." Ph.D., 12 years teaching: V.P. Physical & Historical Geology, Geologic Map Problems, Stratigraphy, Invertebrate Paleo (under mild duress), and General Geography. Research has been in Middle & Late Tertiary Mammals. J. R. Macdonald, 1315 Alturas, Boise, Idaho.

BOX 424. EXPLORATION GEOLOGIST. B.S., M.Sc., 30, married, varied experience, available immediately, desires position in mining, presently employed in clay industry.

BOX 425. GEOLOGIST. 28, Greek nationality, B.Sc. from University of Durham, England, Ph.D. from University of Hamburg, Germany—petrogenesis, studied ore-microscopy for two years at University of Heidelberg, Germany. Special field of interest is radioactive minerals

and their deposits. Presently engaged in research in own laboratory in Addis-Ababa, Ethiopia. Seeking position as geologist or mineralogist in U.S. Speak Greek, English and German fluently.

BOX 426. ASSISTANT PROFESSOR. Ph.D. from leading Eastern university. Sigma XI, 38, family. Desires teaching position in college or university. Two years teaching experience. Over 6 years field and subsurface experience with U.S.G.S. and major oil company. Interest in structural geology, geomorphology, stratigraphy, field and photo geology, petroleum geology.

BOX 427. PROFESSOR. Ph.D., married, no children, conscientious. Prefers research or laboratory work in any of the fields of Stratigraphy, Sedimentation and Structural Geology, Micro- and Macrofauna, Economic and Petroleum Geology. U.S.G.S. rating for XI. U.S. citizen. Over 40 years of teaching and research experience in Europe and in America (here three years of professorship). Over 60 geological publications in German, Hungarian and English. Keep up with literature. If interested will be glad to send complete record. Available June.

BOX 428. PALYNOLOGIST. MS, 31, married, two years collegiate, three years industrial experience in Spore and Pollen field. Desires to relocate with company interested in such a program. Would also consider college undergraduate teaching position with research and advanced degree possibilities in Palynology.

ENGINEERING GEOLOGIST. B.S., M.S. in June 31, married, 7 years overseas and domestic experience in site recon., borings, mapping, materials investigations, groundwater, photogeology and soil mechanics testing and design. Walter S. Newman, 34-20 79th Street, Jackson Heights 72, New York.

BOX 429. MINERALOGIST-GEOLOGIST. Ph.D. Seeks teaching position with opportunities for research and professional growth. Major interest: mineralogy and crystallography. Experience: field work, 1½ years; teaching, 2 years; research (X-ray diffraction analysis) 2 years. Available: Fall, 1958.

BOX 431. GEOLOGIST. 29, married, vet., B.S. 1957. Desires position in exploration, petroleum, or minerals, domestic or foreign. Available immediately.

GRADUATING GEOLOGIST (B.A. degree). desires per pos. with good future in geology or related work; prefer Rocky Mountain area; some exp., sedimentation petrography, structural geology. J. D. Supola, 205A Craighead Apts., Missoula, Montana.

BOX 432. GEOLOGIST. Ph.D., 48, wife and child, 18 years broad experience in Economic Geology, Mineralogy, Tectonics, Mining and General Geology, Petrography; detailed and reconnaissance mapping in wide areas of Europe, Asia and North America; all phases of exploration and research; have publications and an invention patent; speak English, German, Russian, Turkish and several less known oriental languages; seek position in research or exploration, will consider teaching or consulting.

BOX 433. GEOLOGIST. Ph.D., 48, family, desires teaching position particularly in Elementary Geology, Mineralogy, Petrology, Economic Geology, or Structural Geology. Presently employed by U.S.G.S. Experience includes 9 years teaching, part as head of small department. Available for Summer or Fall opening.

BOX 434. GEOLOGIST. Ph.D., desires permanent teaching position. Interest in teaching Elementary Geology, Sedimentation, Stratigraphy, ground water, Engineering Geology, Economic Geology, Metamorphic Geology. Ten years experience in teaching, USGS, industry.

POSITIONS WANTED—Continued

BOX 435. GEOLOGIST, M.A., 34, married, 6 yrs. experience in mineralogy, petrology, some mapping; publications. Interested in mineralogy, petrology, general geology, groundwater. Anywhere in U.S.A. Available immediately.

BOX 436. GEOLOGIST, Ph.D. (June '58), 30, married, family. 4 years' research-teaching experience in petrology, mineralogy, areal geology. Desires career teaching position in school with at least moderate equipment, library facilities.

BOX 437. MICROPALAEONTOLOGIST, M.S., 27, 2 years experience state geological survey, 1½ years teaching experience. Desires teaching position in college or university. Available June.

BOX 438. GEOLOGIST, 26, married, B.S., some graduate work, desires position in laboratory, petroleum or minerals, available immediately.

BOX 439. PALEONTOLOGIST, 30, Ph.D., paleozoic interests, seven years teaching experience in English Universities, desires University post in U.S. or Canada.

BOX 440. GEOLOGIST, 29, Vet., married, B.S., M.S. requirements except thesis. Trained in heavy mineral separation and analytical techniques by major company, experience in field mapping, drafting and glacial problems. Working knowledge of Spanish. Desires permanent position in U.S. Instructorship in small college with opportunity to complete M.S. acceptable. Available April 1.

BOX 441. GEOLOGIST, M.S., desires teaching position for 1 or 2 years (longer if institution offers Ph.D.). 2 years teaching experience. Available June and Sept. 1958.

BOX 442. MINERALOGIST-MICROSCOPIST, Ph.D., Canadian citizen. Special training and 20 years experience in microscopic examination of ores, with own comprehensive, modern and valuable polishing and microscopic equipment. desires permanent position as research associate with major university in the U.S. Interested in teaching.

BOX 443. RESEARCH CHEMIST desires position in exploration and development of mineral resources including petroleum. Applicants must furnish character and business references and must be willing to pay correspondence and interview expenses. Not a free consultant.

BOX 444. PALEONTOLOGIST-STRATIGRAPHER, Ph.D., eleven years teaching experience, desires college teaching position in eastern Gulf Region. Excellent references.

BOX 445. GEOLOGIST, B.S., 26, recent graduate, family. Desire position as geologist. No specialties, average student, well rounded background. 4 years drafting experience.

BOX 446. GEOLOGIST, BA, 40, married, 11 years experience in all phases of petroleum exploration with both major and minor companies in Calif., Rockies, and the mid-continent. Includes 7 years in supervision and management capacity. Also 3 additional years of experience in mineralogy and paleontology. Good at organization. Would like to conduct exploration program in foreign country. Wish to relocate with family in Australia, southern Europe, Peru or Canada.

CONSULTANTS

CONSULTING GEOLOGIST, Arnold Buzzalini, Box 3357 Albuquerque, New Mexico; Box 1456 Durango, Colorado.

THE GEOPHOTO GROUP

Denver, Colorado - Calgary, Alberta

Tripoli, Libya

WORLD-WIDE
PHOTOGEOLOGIC EVALUATION
AND
DETAILED SURFACE MAPPING

GEOPHYSICAL SURVEYS

LAND OR UNDERWATER DETAIL OR RECONNAISSANCE

**FOUNDATIONS
GROUND WATER
SITE INVESTIGATION**

WESTON GEOPHYSICAL ENGRS. INC.
P.O. BOX 306 WESTON 95, MASS.

SERVICES & SUPPLIES

WANTED TO BUY: Geological and other Scientific Journals. Geo. Ashley. 27 E. 21, N.Y. 10, N.Y.

**SUBSURFACE EXPLORATION**

"We look into the Earth"
Pennsylvania Drilling Company
Pittsburgh 20, Pa.

**THIN SECTIONS—POLISHED SECTIONS
MINERALOGRAPHY—PETROGRAPHY**

MICROPALAEONTOLOGY**Prompt Service—Satisfaction**

S. M. del Rio, E.M.
P.O. Box 453, Golden, Colorado
Please write for rates

SPRAQUE & HENWOOD, INC.

Drilling Services
Foundation Investigations Test Boring
Grout Hole Drilling and Pressure Grouting
Diamond Core Drilling
221 W. Olive St., Scranton, Pa.
New York, Philadelphia, Pittsburgh, Atlanta
Grand Junction, Colorado
Buchans, Newfoundland

THE McLEAN PALEONTOLOGICAL LABORATORY

CARD CATALOGUE OF FORAMINIFERA, OSTRACODA, AND BOLIVARIAN SCLERITES AVAILABLE BY SUBSCRIPTION; OTHER CARD CATALOGUES PENDING, OR CREATED BY SPECIAL AGREEMENT OR ON CONTRACT FOR OIL COMPANIES OR RESEARCH INSTITUTIONS. MICROPALAEONTOLOGICAL RESEARCH AND TRAINING PROGRAM OFFERED.

SPECIAL SERVICES FOR OIL COMPANY PALEONTOLOGISTS AND STRATIGRAPHERS, INCLUDING SPECIALIZED DATA COMPILATIONS.

P. O. Box 916, Alexandria, Virginia, U.S.A.

THIN SECTIONS

Petrographic thin sections made from your cores, core chips or sedimentary or metamorphic outcrop samples. Careful attention to individual orders. Quality workmanship. Satisfaction guaranteed. Reasonable prices. Price list on request.

**CAL-BREA, P. O. Box 254
BREA, CALIF.**

E. J. LONGYEAR CO.

Geological and Mining Consultants
Photogeology

76 South 8th Street	Minneapolis, Minn.
Graybar Bldg.	New York 17, N. Y.
Colorado Bldg.	Denver 2, Colo.
Shoreham Bldg.	Wash. 5, D. C.
77 York Street	Toronto, Ont.
Longyear et Cie	Paris, France
Longyear N. V.	The Hague, Holland

Openings in

EXPLORATION RESEARCH

at

THE PURE OIL COMPANY RESEARCH CENTER

CRYSTAL LAKE, ILLINOIS

GEOPHYSICIST, Ph.D., to develop and pursue a program in seismic research. Must have physics or mathematics background and experience in seismic research, both theoretical and applied.

GEOPHYSICIST, M. S. or Ph.D., to assist in development and pursuit of seismic research program as described above. Experience desirable but not necessary.

GEOPHYSICIST, B.S. or M.S. for liaison duties in seismic work between the research laboratories and field operations. Field experience is necessary.

GEOPHYSICIST, B.S. or M.S. to assist in research and development work in the field of well logging. Good math and physics background necessary.

MINERALOGIST, M.S., to assist in research and service in general and clay mineralogy. Good undergraduate background in chemistry, physics and mathematics. Graduate work should emphasize chemistry and mineralogy.

PALEONTOLOGIST-ECOLOGIST, Ph.D. or equivalent, to participate in environmental studies in a stratigraphic research program; the emphasis will not be on taxonomic paleontology. Familiarity with modern methods in paleontology (statistics, etc.) required.

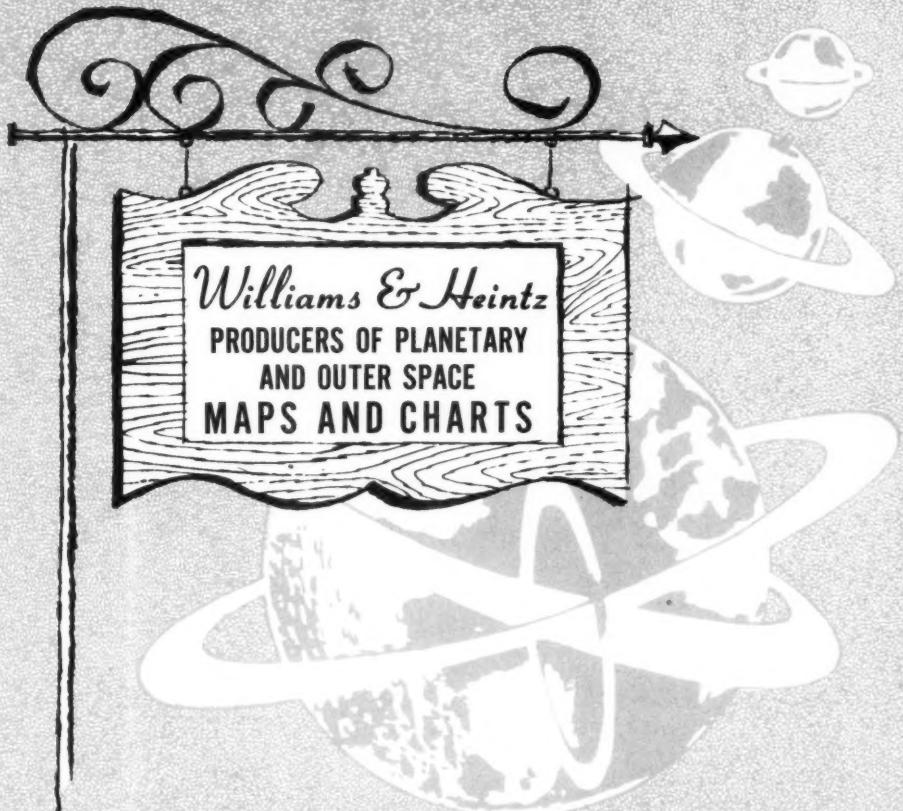
STRATIGRAPHER, M.S. or equivalent, to participate in a program of stratigraphic research. Should have knowledge of modern methods of stratigraphy (facies studies, mapping techniques, etc.). Field work will be required.

SEDIMENTOLOGIST, M.S., to participate in research program on stratigraphic traps and reservoir rocks. Must have good background in chemistry, physics and mathematics and knowledge of modern laboratory and data analysis techniques.

Please apply to: D. M. DAWES
THE PURE OIL COMPANY
Research Center, Crystal Lake, Illinois







You bet we're proud of our country's progress in outer space investigation. In fact, we expect some client to come a-walking in any day now with a printing job related to planetary travel!

For as surely as "Explorer" is circling our globe, modern printing will have a vital part in the charting and recording of tomorrow's adventure into infinity. Williams & Heintz are specialists in the production of all kinds of maps and charts from simple geographic ones to aeronautical charts and complex scientific types. And, we provide cartographic consultation service on a no obligation basis. So, by reason of our proven skill, 30 years of experience, and recognized know-how, we are ready to tackle any printing job in this category regardless of its scientific complexities. However, whether your printing needs are out-of-this-world or simply down-to-earth, please Call LI 3-7140 —or write—we'd like the privilege of serving you.

**WILLIAMS & HEINTZ LITHOGRAPH CORPORATION
220 EYE STREET, NORTHEAST, WASHINGTON, D. C.**

GEO TIMES

2101 Constitution Ave.,
Washington 25, D. C.
Form 3547 Requested
Return Postage
Guaranteed.

~~NEW~~ PUBLICATIONS

EARTH FOR THE LAYMAN by Mark W. Pangborn, Jr., about 64 pages, 1957, \$1.00 paper bound.

An annotated listing of more than 1400 popular books on geology and related subjects for lad, lass and layman. The book is conveniently divided by subject. Books suitable for youth are particularly noted. Professional geologists themselves will find this valuable for references on history of geology and biographies of famous geologists.

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, J. V. Howell, Coordinating Editor, 325 pages, 1957, \$6.00.

A comprehensive glossary containing nearly 14,000 terms compiled by more than 90 geologists working under the auspice of the American Geological Institute. More than 7,000 entries are in italics, making this a major contribution to geologic literature.

AGI REPORT 11, 1956-57 Edition "DEPARTMENTS OF GEOLOGICAL SCIENCES IN THE EDUCATIONAL INSTITUTIONS OF THE U. S. AND CANADA." 196 pages, 1957, \$1.50.

Detailed listing of faculty, courses, degree requirements in college departments offering geology and geophysics. Also lists geology summer camps. An aid to prospective students, academic administrators and industry personnel departments.

DIRECTORY OF GEOLOGICAL MATERIAL IN NORTH AMERICA, Second Edition, 1957, by J. V. Howell, A. I. Levorsen, with Robert H. Dott and Jane W. Wilds of the AAPG, over 300 pages, cost \$3.00.

An indispensable volume with information on sources and availability of geological journals and selected literature, geologic maps and base maps, aerial photographs, libraries, geologic supplies and supplies, and sources which are provincial and state in scope are listed separately. This is invaluable to the practicing geologist and an important addition to the library of the student. This is a reference book which will travel with you wherever you go.

AGI REPORT 12, 1956 Edition, "SURVEY OF GEOLOGY-GEOPHYSICS STUDENTS IN THE COLLEGES AND UNIVERSITIES OF THE U. S. IN 1955-56 AND OF AVAILABLE SCHOLARSHIPS, FELLOWSHIPS, ASSISTANTSHIPS, ETC." 1956, \$0.50.

A detailed listing of geology and geophysics graduates by school, together with generalized data on available financial aids.

AGI REPORT 12, 1957 Edition, "SURVEY OF GEOLOGY-GEOPHYSICS STUDENTS IN THE COLLEGES AND UNIVERSITIES OF THE U. S. AND CANADA IN 1956-57," \$0.50.

Contains detailed information on 1957 student survey, but does not contain scholarship-fellowship data listed in the 1956 report above.

~~NEW~~ GEOLOGIC DATA SHEETS:-

Nos. 1-3 GEOLOGIC MAP SYMBOLS \$0.25 for set of 3

No. 4 AVAILABILITY OF PUBLICATIONS AND OTHER DATA OF THE U. S. GEOLOGICAL SURVEY, \$0.10.

Order these publications from the

**AMERICAN GEOLOGICAL
INSTITUTE**

**2101 Constitution Ave., N.W.
Washington 25, D.C.**

Payment must accompany order.



ME INFLUENCE YOU?
You know *GEO TIMES*
is a good advertising
medium

